SECTION 2 - INSTALLING ADAPTER CARDS

INTRODUCTION

WARNING	**Always turn off power to the computer and disconnect the power cord when inserting adapter cards in your computer.**

CAUTION	**Always wear a conductive groundstrap when handling adapter cards to prevent damage to components by electrostatic discharge.**

NOTE: The instructions in this section apply to AT-type computers ONLY. AT-type computers are 80286, 80386, 80486 and Pentium based IBM PC/AT-compatible computers.

PC HARDWARE INSTALLATION CONSIDERATIONS

Every time you use a PC and install utility cards in the slots provided, you run the risk of conflicts with the hardware.

NOTE: It is critical that you understand your hardware. We recommend you to have a list of the interface cards and other devices as well as the interrupts and memory locations used by each. This information is needed during Startup as you are configuring each node.

HARDWARE SETTINGS

Many of the cards you insert in your computer's expansion slots require hardware settings. These settings are:

- ROM addresses
- I/O port addresses
- Interrupts
- DMA channels

Settings are usually selected using jumper pins or dipswitches on the interface card.

The settings you make for each adapter card must not conflict with the settings on any other card.

Follow Tables 2-1 through 2-4 to choose the settings for the adapter cards of commonly installed peripherals.

Switch settings for the following recommended computers are to be found in Appendix C:

HP VECTRA XU/XUC/XMA 590 - ETHERNET
HP VECTRA VL2 - ETHERNET
DEC VENTURIS (486) - ETHERNET
DEC VENTURIS (486) - CLIENT - ETHERNET
DEC CELEBRIS/VENTURIS 590 - ETHERNET

Memory Address Locations

Each PC made to AT Compatible standards has memory allocated between 640K and 1MB for use with expansion cards. The addresses start at A0000 and continue to FFFFF. The memory blocks are in 64K segments and a typical map looks something like this:

A0000-AFFFF EGA/VGA VIDEO LOCATION

B0000-BFFFF CGA/MONO (TEXT MODE ON VGA CARD)

C0000-CFFFF Hard Disk ROM (SOME SPACE AVAILABLE)

D0000-DFFFF

E0000-EFFFF Large BIOS

F0000-FFFFF Not Available

The space from A0000 to AFFFF is used for the video EGA/VGA, there may be some space available here or there may not.

B0000 to BFFFF is not available since the text portion of the VGA card uses this area.

C0000 to CFFFF has some available space, as an example you can set your SCSI controller to sit at CC00 and have your Ethernet card at C800. (The size between breaks is 16KB, (4000hex), so that would be C8000 + 4000 = CC000.)

D0000 to DFFFF is unused initially, and is available for expansion cards. This may be a ROM or RAM address depending on the card being used.

E0000 to EFFFF is the last available memory location and may already be used with a large BIOS.

Table 2-1. ROM Addresses

Adapter Card	Factory Setting	Recommended Setting	Notes
ARCnet Network Card	dc000-ddfff	ce0000-cffff	—
CTI Intellicon Serial Communications Card	d0000-dffff	d0000-dffff	—
Video adapter cards	—	—	not set by user
Adaptec AHA-1540 SCSI Host Adapter	dc000	cc000	—
Adaptec AHA-1542B SCSI Host Adapter	dc000	cc000	—
Adaptec AHA-1540C SCSI Host Adapter	dc000	cc000	set via dipswitches
Adaptec AHA-1542C SCSI Host Adapter	dc000	cc000	set via dipswitches
Alta NE2000 Ethernet Adapter	—	c8000 or D4000	jumper selectable

I/O Ports

Input output ports (I/O ports) allow your microprocessor to communicate with your expansion cards. Each card must use a unique set of ports. No two cards can share a port and most cards use a series of ports.

Some typical uses are:

Table 2-2. Typical I/O Ports

I/O Ports	Uses
200-20F	Joystick
23C	Bus mouse
270-27F	LPT2
2E0-2FF	Com2/Com4
320-320	XT disk controller
370-37F	LPT1
3B0-3BB	Monochrome display
3C0-3CF	Ega display
3E0-3EF	Com1/Com3, Floppy controller

Other standard hardware used with LAN-90 PCV uses:

Table 2-3. Other I/O Ports

I/O Ports	Uses
300-303	CTI Intellicom serial card
234-237	Adaptec SCSI

Table 2-4. I/O Port Addresses

Adapter Card	Factory Setting	Recommended Setting	Notes
ARCnet Network Card	not used	—	not used
CTI Intellicon Serial Communications Card	300-303	300-303	—
Video adapter cards	—	—	not set by user
Adaptec AHA-1540 SCSI Host Adapter	330	234	—
Adaptec AHA-1542B SCSI Host Adapter	330	234	
Adaptec AHA-1540C SCSI Host	330-333	234-237	set via dipswitches
Adaptec AHA-1542C SCSI Host	330-333	234-237	set via dipswitches
Alta NE2000 Ethernet Adapter	300	320, 340 or 360	jumper selectable

Interrupts

Most cards need to tell the processor when they have information for the processor to handle. Getting the attention of the processor is done through interrupts. Each card is assigned an interrupt number through which it can make requests of the processor. Interrupts are also called IRQs, which stands for Interrupt ReQuest. The number used by each card must be unique.

There are only fifteen IRQs available as IRQ 9 cascades to IRQ 2. The recommended settings are found in Table 2-5.

Table 2-5. Common IRQ assignments

IRQ	Usage
0	Unavailable - Timer
1	Unavailable - Keyboard
2	Mouse*
3	Mylar keyboard** (Com2)
4	CIU** (Com1)
5	Lpt2 (hard drive on XTs)
6	Floppy
7	ARCNET card* (Lpt1)
8	Unavailable - System clock
9	Unavailable - cascaded by IRQ 2
10	Ethernet card*
11	SCSI adapter*
12	
13	IDE hard drive
14	
15	CTI multiport serial card*

*recommended setting.
**recommended if no CTI card.

Usually IRQ7 is not used by the printer, as printers seldom send data to the computer, and thus this IRQ can service the Arcnet Card.

Table 2-6. Interrupts

Adapter Card	Factory Setting	Recommended Setting	Notes
ARCnet Network Card v2.1and earlier	2	7*	set with jumpers
ARCnet Network Card v2.2 and later	7	7*	set via menu
CTI Intellicon Serial Communications Card	3	15	—
Video adapter cards	not used		—
Adaptec AHA-1540 SCSI Host Adapter	11	11	—
Adaptec AHA-1542B SCSI Host Adapter	11	11	
Adaptec AHA-1540C SCSI Host	11	11	set via menu
Adaptec AHA-1542C SCSI Host	11	11	
Alta NE2000 Ethernet Adapter	3	10	jumper selectable

*You may need to use an interrupt of 5 if you experience a conflict between the network card and the printer port.

DMA Channels

The hard drive uses the direct memory access (DMA) controller for rapid data transfer from disk to memory. The recommended DMA channel is shown below.

Table 2-7. DMA Channels

Adapter Card	Factory Setting	Recommended Setting	Notes
ARCnet Network Card	not used	—	—
CTI Intellicon Serial Communications Card	not used	—	—
Video adapter cards	not used	—	—
Adaptec AHA-1540 SCSI Host Adapter	5	5	—
Adaptec AHA-1542B SCSI Host Adapter	5	5	—
Adaptec AHA-1540C SCSI	11	11	set via menu
Adaptec AHA-1542C SCSI	11	11	
Adaptec AHA-1542CF SCSI	11	11	

VIDEO ADAPTER CARDS

Super VGA and VGA Cards

Most VGA video cards have internal software switches that determine the display mode or output to different types of monitors. These software settings can only be changed by using a configuration program supplied by the manufacturer of the card. If you have a SVGA card and you find it doesn't display graphics properly after you have completed installing (e.g.,

only two thirds of the graphics display appears on the screen), reboot the computer using DOS, and run the configuration program supplied by the card manufacturer. Check that the default display mode is set to SVGA, the resolution is set to 1024x768 and the monitor type matches the monitor you have connected to your card.

LAN-90 PCV supports the ATI Graphics Ultra (family of SVGA) cards with 2Mb of video memory.

> **NOTE:** Ensure that the ATI Graphic card is configured to operate in 16-bit mode. Cards set to 8-bit mode will result in degraded perfo-mance.

SERIAL AND PARALLEL PORTS

Usually, there are serial ports and parallel ports already built into the computer, so you do not have to install them yourself.

Some computers require that you add an expansion board with a second serial or parallel port. If so, follow the directions in the manual supplied with the card or the manual supplied with your computer.

CTI Intellicon Serial Card

The CTI card's default settings is IRQ 3. This is the IRQ line normally assigned to a second serial port. If your computer has a second serial port, you must disable it if you wish to use the CTI card's default settings. We recommend you, select IRQ 15 or another IRQ not in conflict with any other of your com-puter's settings.

If you have followed the instructions given in this manual and still experience interrupt conflicts, contact your Elsag Bailey service representative for details on changing settings on the CTI card and modifying the console configuration to use the new settings.

Figure 2-1 shows the correct dipswitch and jumper settings for the CTI Intellicon serial card.

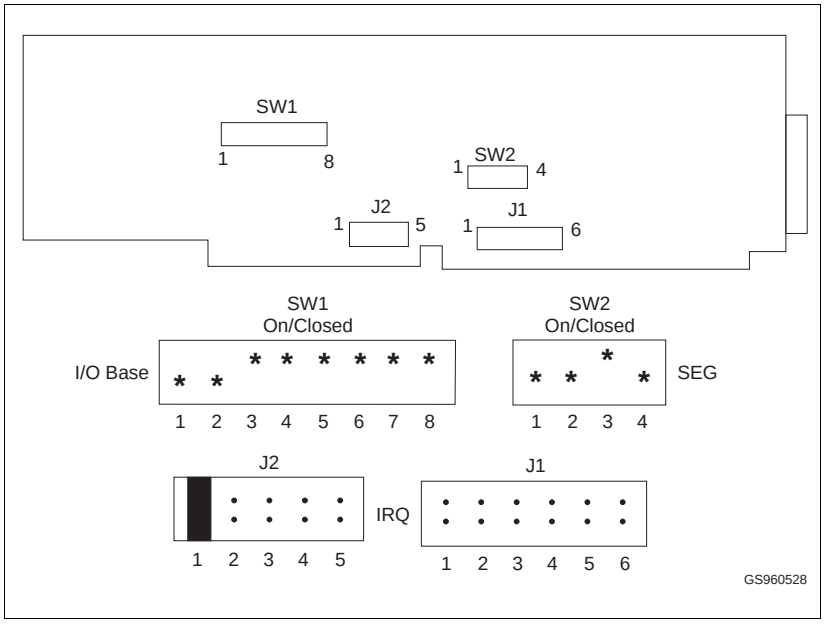

Figure 2-1. CTI Intellicon Serial Card Switch Settings

NETWORK CARDS

Ethernet Network Card

If you are setting up an Ethernet network, you will need one card for each computer connected to the network.

You will need to record the Ethernet address and keep track of the computer it is in. Use copies of the form supplied as Appendix B. The Ethernet's 12 digit address can be found on a label on the card or can be displayed using the card's DOS based software utilities. Refer to Figure 2-2.

Diskless Clients require different hardware settings than those of Servers and Clients with disks.

HP On-Board Ethernet

The HP XU and XM series of computers have a built in ethernet adapter. This adapter is supported for use in the LAN-90 PCV system. This adapter is NOT support for use with a diskless Clients.

To configure the adapter, you must use the ROM BIOS setup provided by HP. On boot up, the “System Hardware Test” screen will show the progress of the BIOS as it checks the computer's hardware.

- Press <F2> on this screen to enter the setup screen.

- Locate the entry for the PCI Integrated Ethernet Interface, refer to the computer's User's Guide.
- Enable the PCI Integrated Ethernet Interface.
- Press <F3> to save the change, exit the setup program and reboot the computer.
- When the computer reboots, the unique PCI Integrated Ethernet Interface address will be enabled and displayed. For the XU series you must return to the page in the setup menu where you enabled the interface. For the XM series, it is displayed on the summary of the computer's hardware. Record this address in the Network Planning form.

When you install both the QNX Operating System and later on the LAN-90 PCV software, selected the NE2100 Ethernet driver. Using the NE2100 ethernet driver will not require an entry for the IRQ or I/O address.

WinStar-16

The WinStar-16 is an ISA bus, NE1000/NE2000 compatible ethernet card. All configuration settings are done using a DOS based setup program supplied with the card. Refer to the ***WinStar-16*** manual for details on the various settings. Using the following procedure to start the DOS based setup program to configure the WinStar-16 Ethernet card as shown in Table 2-8.

- Boot the PC into DOS
- Place the WinStar-16 Utility disk in the floppy drive
- Enter the command: **a:\WSPNP**
- Select the menu item **View Current Configuration** from the Main Menu
- Record the Ethernet address in Appendix B for this node
- Verify the ethernet's card settings as listed in Table 2-8. If they do not match, then return to the Main Menu and select the menu item **Setup WINSTAR-16** and modify the configuration accordingly.

Table 2-8. WinStar-16 Configuration

Option	Recommended Settings	
	Server or Client-with-Disk Node	Diskless Node
Operating Mode	Jumperless	Jumperless
Ethernet Address[1]	**********	**********
Medium Type[2]	Auto Detect	Auto Detect
Full-duplex	Disabled	Disabled
I/O Base[3]	340h	340
Interrupt[4]	10	10
Boot ROM	No Boot ROM	C800, 16K

Notes:

1. The 12 digit ethernet address is unique per card.
2. The card's firmware will automatically detect the type of cable connected to the card. You can also specifically select either 10BaseT or 10Base2.
3. Alternative I/O Base addresses available are 320 and 360. Before using address 360, check that the parallel port is not assigned to address 378.
4. Alternative Interrupts are 5 and 11. Before using interrupt 11, check that your PC is not using a SCSI controller.

ALTA EtherCombo-16 T/C

The ALTA is an ISA bus, NE1000/NE2000 compatible ethernet card. All configuration settings can be done using either the provided DOS based utility program or jumpers (Figure 2-2), it is recommended that the jumpers be used to configure the card. The recommended jumper settings are listed in Table 2-9. The DOS based utility program supplied with the card also provides a number of diagnostics. Refer to the ***ALTA EtherCombo-16+ T/C*** manual for details on the various jumper settings and diagnostics.

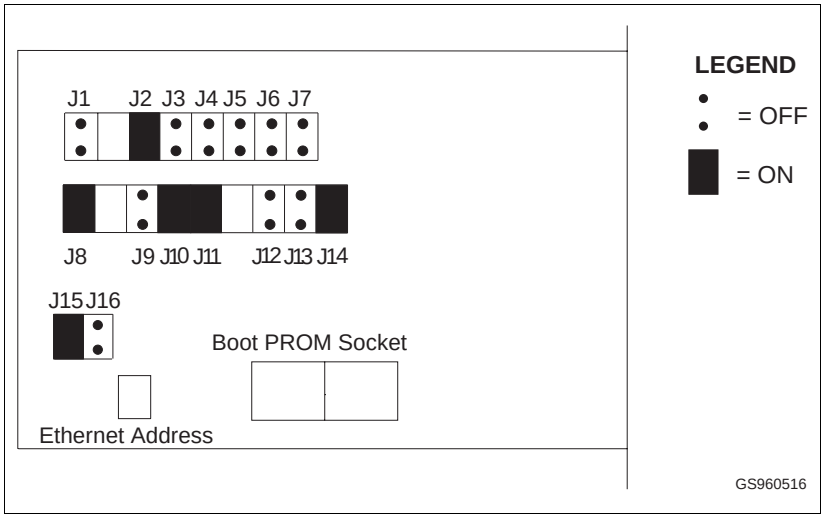

Figure 2-2. Alta Ethernet Network Card Settings

Using the following procedure to start the DOS based setup program to configure the ALTA EtherCombo-16 T/C Ethernet card as shown in Table 2-9.

- Boot the PC into DOS
- Place the ALTA EtherCombo-16+ T/C Utility disk in the floppy drive
- Enter the command: **a:\ALTA**
- When the Software Configuration menu is displayed, press <Enter>.
- Record the Ethernet address in Appendix B for this node
- Verify the Ethernet's card settings as listed in Table 2-9. If they do not match, then exit the program, power down the PC and check the jumpers.

Table 2-9. ALTA EtherCombo-16 T/C Configuration

Option	Recommended Settings			
	Server or Client-with-Disk Node		Diskless Node	
	Value	Jumpers	Value	Jumpers
Configuration Mode	Hardware	J1 = OFF	Hardware	J1 = OFF
Cabling Type[1]	BNC	J2 + J3 =ON + OFF	BNC	J2 + J3 =ON + OFF
ROM Address[2]	C800h	J5 + J6 =OFF + OFF	C800h	J5 + J6 =OFF + OFF
ROM State	Disabled	J7 = OFF	Enabled	J7 = ON
Access Mode	I/O Port	J8 = OFF	I/O Port	J8 = OFF
I/O Base Address[3]	340h	J9 + J10 + J11 = OFF + ON + ON	320h	J9 + J10 + J11= ON + OFF + ON
IRQ Settings [4]	10	J12 + J13 + J14 = OFF + OFF + ON	10	J12 + J13 + J14 = OFF+ OFF + ON
8/16 Bit Mode	16 Bit	J15 = ON	16 Bit	J15 = ON
Bus Timing	CHRDY	J16 = OFF	CHRDY	J16 = OFF

Notes:

1. You must specifically select either UTP (10BaseT, using RJ-45 connectors) or BNC (10Base2).
2. Although the Boot ROM is disabled, do not use address D000h. We have found the Boot ROM if installed on the cards will sometimes interfere with the CTI card even though the Boot ROM is disabled. Alternative ROM addresses available are C800h or D400h.
3. Alternative I/O Base addresses available are 320 and 360. Before using address 360, check that the parallel port is not assigned to address 378.
4. Alternative Interrupts are 5 and 11. Before using interrupt 11, check that your PC is not using a SCSI controller.

Arcnet Network Card

If you are setting up an Arcnet network, you will need one card for each computer connected to the network.

Change the dip switches to set the ROM address to CE00 from DC00 to avoid conflicts with the CTI Intellicon card.

The card has a dipswitch in the upper left corner of the card as shown in the Figure 2-3.

On cards with a 12 position switch, you will need to change switches 4, 5, and 6 to 1, 0, 0 as shown in Figure 2-3.

On cards with a 4 position switch, the switch should be set to 1,0,0,1 and the IRQ must also be set to 7 using the jumpers. If a conflict occurs between the network card and the printer port, use interrupt 5.

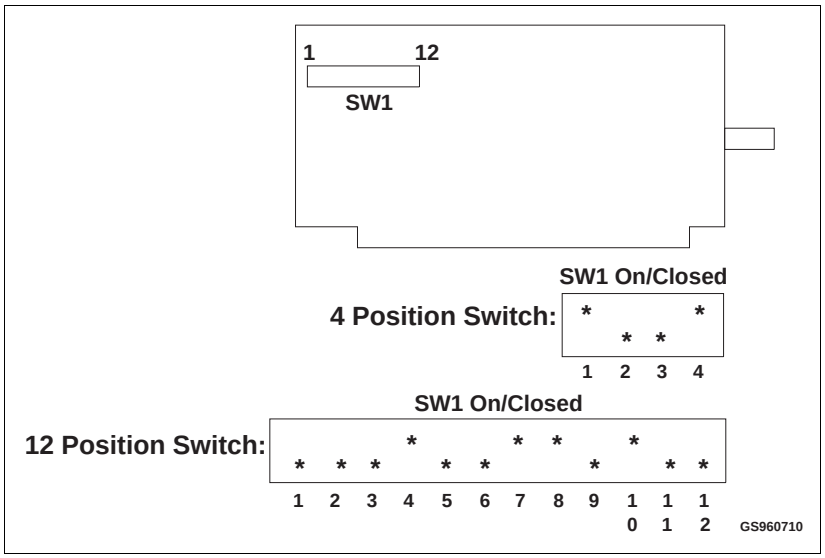

Figure 2-3. QNX Arcnet Network Card Settings

Both cards contain firmware switches that must be set through a configuration program at boot-up time. See ***CONNECTING THE COMPUTER TO THE NETWORK*** in Section 4 for instructions. Configuring a Diskless Client is also covered there.

ADAPTEC 1540B/1542B SCSI HOST ADAPTER CARD

Make the following changes to the Adaptec 1540B/1542B SCSI Host Adapter card jumper to allow the SCSI card to interface to the Optical Disk Drive only.

- You MUST disable BIOS control on the card by removing the jumper from pin 1 on J6.
- Change the I/O Port setting from 330 to 234 by moving the jumper from pin 2 to pin 3 on J7. This prevents conflicts with the CTI Intellicon serial card.
- If you are using the AHA-1542B, disable the floppy disk controller on the Adaptec card by removing the jumper

from pin 1 on J8. This will allow the computer's regular floppy disks to work properly.

Figure 2-4 shows the final settings for the card.

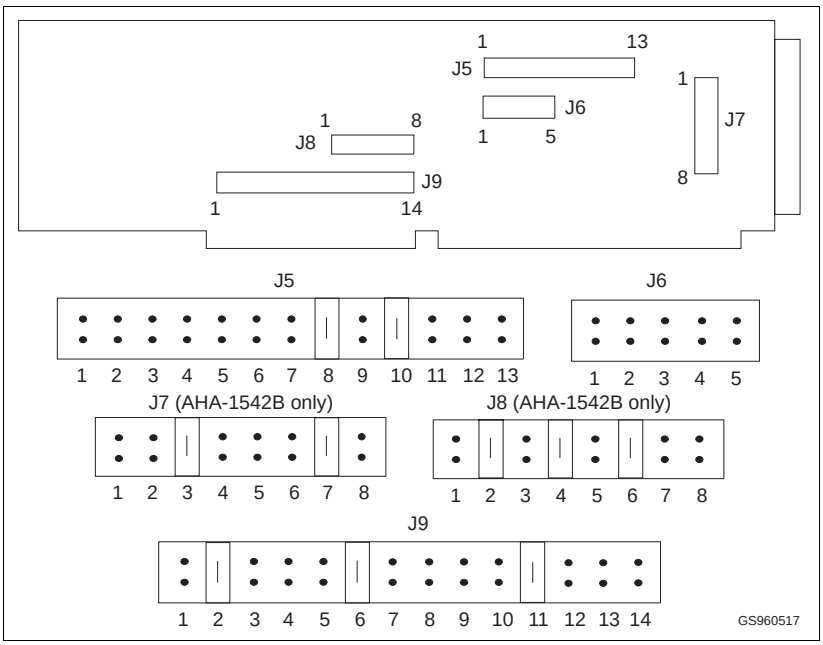

Figure 2-4. Adaptec SCSI Host Adapter Card

- Make these additional changes if the Adaptec 1540B/1542B SCSI Host Adapter also interface to the hard disk:
- If you are using a SCSI controller hard disk, J6 pin 1 must be installed for BIOS control.
- Also Change the ROM address to CC00 by adding a Jumper to J7 (7), pin 7 and remove the jumper from pin 8, if any.

ADAPTEC SCSI HOST ADAPTER CARD: MODEL 1540C/1542C/1542CF

The Adaptec SCSI Adapter card has divided its configuration options between physical dipswitch settings and a group of software set-up menus.

The following settings apply to the Adaptec 1540C/1542C and 1540CF/1542CF SCSI cards interfacing to only the hard disk. Changes in these settings are noted if the SCSI card interfaces to the Optical disk drive only, with the hard disk being interfaced to by another type of disk controller (i.e. IDE).

Dipswitch Settings

Make the following changes to the Adaptec SCSI Host Adapter card dipswitch bank S1 before inserting it in an expansion slot.

- Change the ROM address from the factory setting to the recommended setting as per Table 2-1. Switches 6,8 should be ON (CLOSED) and switch 7 should be OFF (OPEN)

- Change the I/O PORT address from the factory setting to the recommended setting as per Table 2-2. Switch 2,3 should be ON (CLOSED) and switch 4 should be OFF (OPEN)

- The floppy disk option MUST be disabled by ensuring that switch 5 is ON (CLOSED). The default setting for an Adaptec 1542C SCSI controller is OFF (OPEN)

- If the Adaptec SCSI Adapter card ONLY controls either an internal hard disk or an external optical disk drive then the AHA Termination must be enabled, set switch 1 to OFF (OPEN) to allow the termination to be controlled by the software set-up menus.

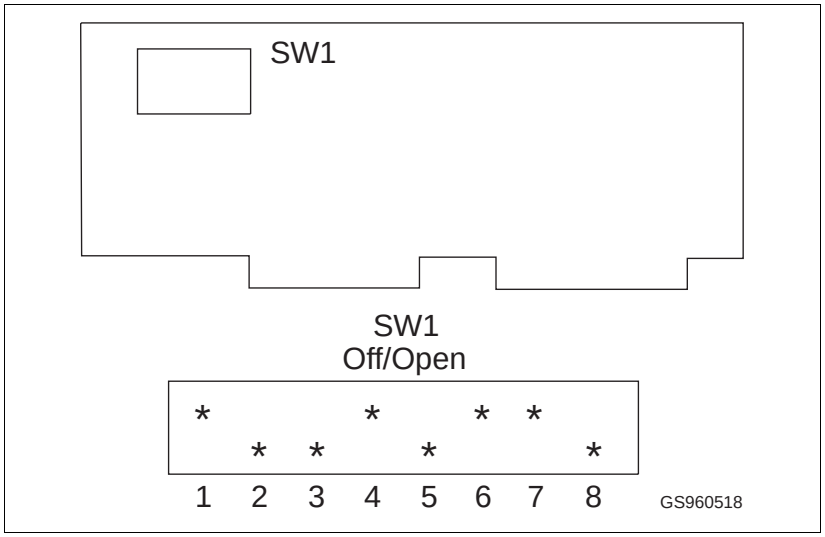

Figure 2-5. Adaptec 1540C/1542C SCSI Host Adapter Card

Software Set-up

The software set-up menus are viewed by rebooting the PC into DOS, during the reboot procedure a heading will appear on the monitor requesting the user to press <Ctrl-A> to access the set-up menus.

The Host Adapter Port Address menu shows a list of all the I/O PORT addresses available, with a highlight bar on the I/O PORT address selected by the dipswitches. Press <Enter> to select the correct Port Address.

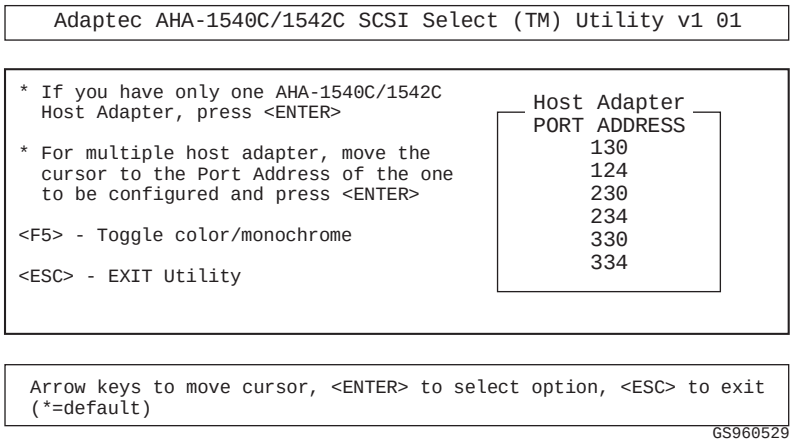

Figure 2-6. Adaptec 1540C/1542C SCSI Host Adapter Card Port Address Menu

The Main Menu allows the user to access one of Configure/ View Host Adapter Settings, SCSI Disk Utilities, Host Adapter Diagnostics.

Proceed to the Configure/View Host Adapter Settings Menu and confirm that the settings have been made as per Figure 2-7.

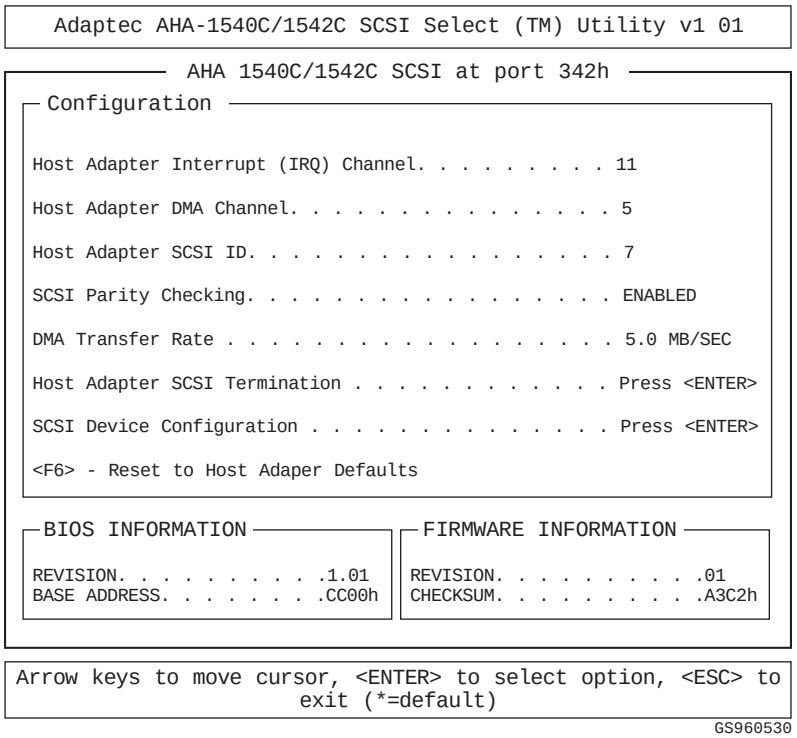

Figure 2-7. Adaptec 1540C/1542C SCSI Host Adapter Card Configure/View Host Adapter Settings Menu

NOTE: The “Host Adapter SCSI Termination” should be DISABLED if the SCSI card interfaces to both the internal hard disk and external optical disk drives.

From the Configure/View Host Adapter Settings Menu, proceed to the SCSI Device Configuration sub-menu and confirm for SCSI Device ID's #0 to #7 that the settings have been made as per Figure 2-8.

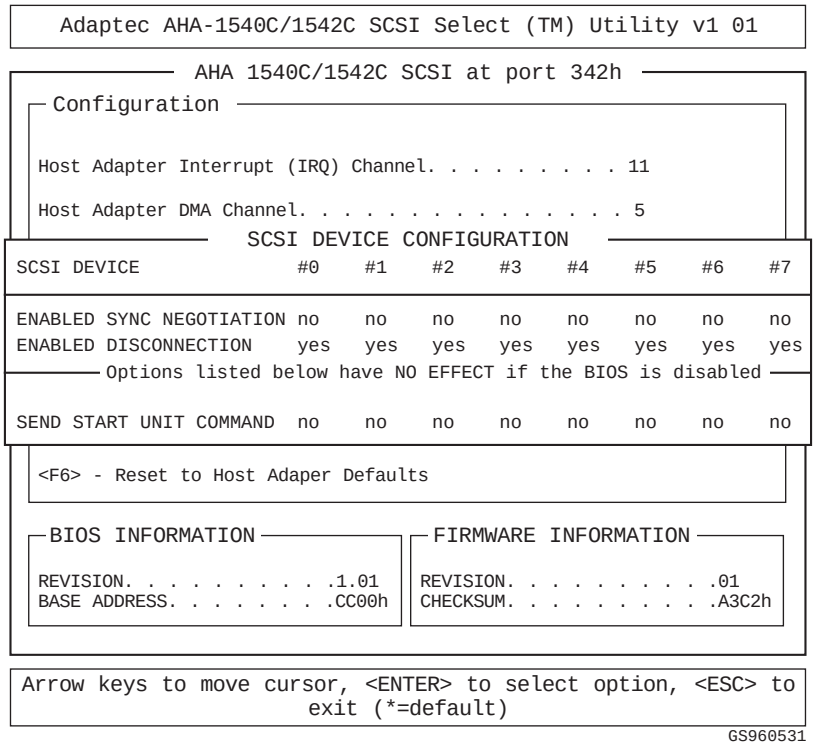

Figure 2-8. Adaptec 1540C/1542C SCSI Host Adapter Card SCSI Device Configuration Menu

Press <Esc> to return to the Configure/View Host Adapter Settings Menu.

From the Configure/View Host Adapter Settings Menu, proceed to the Advanced Configuration Options sub-menu and confirm that the settings have been made as per Figure 2-9.

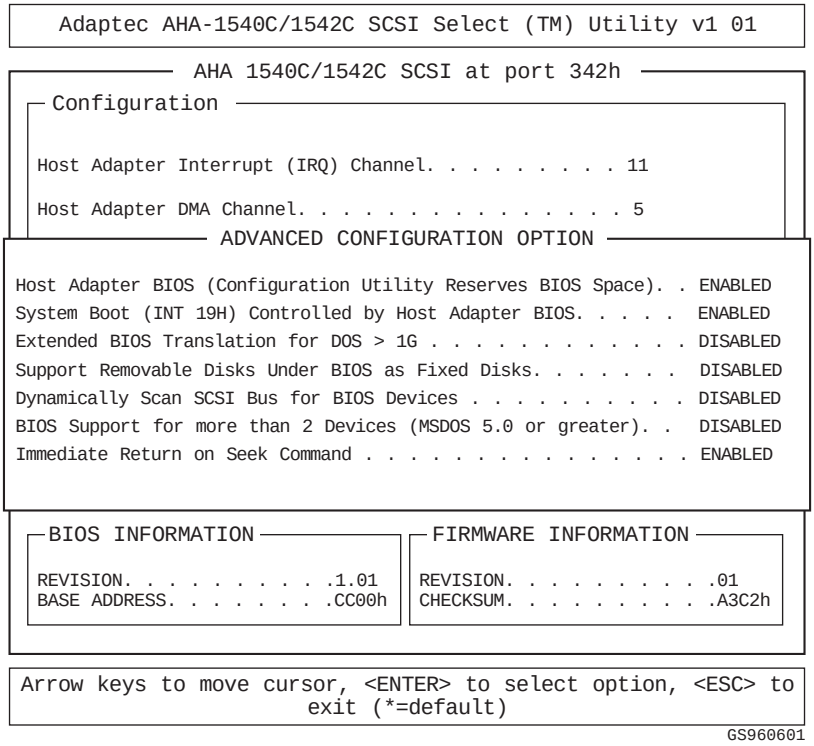

Figure 2-9. Adaptec 1540C/1542C SCSI Host Adapter Card Advanced Configuration Options Menu

Press <Esc> to return to the Configure/View Host Adapter Settings Menu.

> **NOTE:** The “System Boot (INT 19H) Controlled by Host Adapter BIOS” should be DISABLED if the SCSI card interfaces to the Optical disk drive only.

Both the “Dynamically Scan SCSI Bus for BIOS Devices” and the “BIOS support for more than 2 devices” should be ENABLED if the SCSI card interfaces to the optical disk drive only.

MKM/EMKI KEYBOARD SWITCHING

If you are installing an MKM or EMKI keyboard, you can set up two computers on the QNX network so that the one keyboard can be used to operate both computers. This lets operators watch and use two displays, such as a process graphic and the alarm summary, at the same time by switching the MKM or EMKI keyboard input between the two computers (indicators on the screen tell the operator which computer is the active console). Set the two computers so that their monitors can be placed close together. Attach the MKM/EMKI keyboard to one computer. The computer with the MKM/EMKI keyboard is called the main keyboard node; the other computer is called the auxiliary keyboard node. Connect both computers to the network. Further steps are needed to enable the MKM/EMKI keyboard switching, and these are discussed in Section 9.